

What is claimed is:

- 1 1. A connector apparatus for securing a printed circuit board to supporting apparatus  
2 comprising  
3 a body member with upper and lower surfaces;  
4 an internally threaded opening extending into said body member from said upper surface;  
5 and  
6 a plurality of rigid, parallel, cantilevered pins extending from said body member lower  
7 surface and disposed radially outward with respect to said threaded opening.
- 1 2. The connector apparatus of claim 1 wherein said body member is formed of a molded  
2 polymer wherein said threaded opening is formed in a metal insert which presents such internal  
3 threaded opening at said upper surface and said plurality of pins comprise at least three pins  
4 captured by said molded polymer and extending from said lower surface.
- 1 3. The connector apparatus of claim 2 wherein said metal insert is an internally threaded  
2 cylindrical member and said pins are disposed radially outward with respect to said cylindrical  
3 member.
- 1 4. The connector apparatus of claim 2 further comprising means carried by said connector  
2 for engagement with a board on which said connector is mounted to establish alignment of said  
3 connector on said board.
- 1 5. The connector apparatus of claim 4 wherein said means carried by said connector  
2 comprises an axial projection formed as part of said body member, extending parallel to said  
3 pins, wherein said axial projection engages a depression in said board to effect the alignment.

1       6.     The connector apparatus of claim 2 further comprising means carried by said connector  
2     for engagement with a board on which said connector is mounted to establish the distance  
3     separating the connector body portion from said board in the installed condition.

1       7.     The connector apparatus of claim 6 wherein said means carried by said connector  
2     comprises an axial projection formed as part of said body member, extending parallel to said  
3     pins, and having a length equivalent to the separation to be established between said connector  
4     body member and a board on which said connector apparatus is mounted.

1       8.     The connector apparatus of claim 2 wherein said body member molded polymer is an  
2     electrically insulating material which electrically insulates said pins from said metal insert which  
3     presents a threaded opening.

1       9.     The connector apparatus of claim 2 wherein said body member molded polymer is an  
2     electrically conducting material which provides an electrically conductive path between said pins  
3     and said threaded metal insert.

1       10.    The connector apparatus of claim 1 wherein said body member includes a pair of parallel  
2     side surface portions whereby said body member can be grasped by a tool to enable manual or  
3     automated fabrication of said connector apparatus.

1       11.    A circuit board including connector structure for attachment to supporting apparatus  
2     comprising  
3         a circuit board;  
4         a connector body portion with an upper surface facing away from said circuit board and a  
5         lower surface which confronts said circuit board;  
6         a central threaded opening extending into said connector body upper surface;  
7         a plurality of rigid, parallel, cantilevered pins secured to said connector body portion and  
8         extending to said circuit board;

9           a like plurality of openings in said circuit board which are aligned with and into which  
10          said pin cantilevered ends respectively extend; and

11           means securing said pin cantilevered ends respectively in said plurality of circuit board  
12          openings.

1       12.    The circuit board connector structure of claim 11 wherein said like plurality of openings  
2          in said circuit board are parallel vias extending through said circuit board and said means  
3          securing said pin cantilevered ends comprises soldering said pins within said vias.

1       13.    The circuit board connector structure of claim 12 wherein said body portion is formed of  
2          a polymer material in which is captured a metal insert with said central threaded opening being  
3          an internal threaded surface within said insert that extends from said upper surface and said pins  
4          have end portions encapsulated and retained by said polymer and are disposed radially outward  
5          with respect to said metal insert and said body portion further includes a pair of parallel side  
6          surface portions, whereby said body portion can be gripped by a tool to enable manual or  
7          automated fabrication of said connector structure or assembly of said connector structure to said  
8          circuit board.

1       14.    The circuit board connector structure of claim 13 wherein said metal insert is an  
2          internally threaded sleeve extending axially into said polymer body portion from said upper  
3          surface.

1       15.    The circuit board connector structure of claim 14 wherein when the connector structure is  
2          assembled to said circuit board with said cantilevered pins secured within said circuit board vias,  
3          said body portion is secured to, but spaced from said circuit board.

1       16.    The circuit board connector structure of claim 15 further comprising means for limiting  
2          penetration of said connector pin cantilevered ends into said circuit board openings.

1 17. A connector apparatus for securing a printed circuit board to supporting apparatus  
2 comprising  
3 a body member with upper and lower surfaces;  
4 an internally threaded surface extending into said body member from said upper surface  
5 thereof;  
6 a plurality of rigid, parallel, cantilevered pins secured to said body member and extending  
7 perpendicular to said lower surface in the direction opposite the direction to which said internally  
8 threaded surface opens.

1 18. The connector apparatus of claim 17 wherein said body member is formed of a molded  
2 polymer and further comprising a metal insert captured by said body member molded polymer  
3 with said internally threaded surface formed as an internal threaded surface within said metal  
4 insert.

1 19. The connector apparatus of claim 18 wherein said metal insert includes an irregular outer  
2 surface which engages said body member polymer to resist extraction of said metal insert from  
3 said molded polymer body member and rotation of said metal insert with respect to said molded  
4 polymer body member.

1 20. The connector apparatus of claim 19 wherein said cantilevered pins are formed of metal  
2 with an end portion captured within said molded polymer body member.

1 21. The connector apparatus of claim 20 wherein said cantilevered pins include irregular  
2 surfaces within said molded polymer body member and are positioned radially outward with  
3 respect to said metal insert.

1 22. The connector apparatus of claim 17 wherein said body member includes a pair of  
2 parallel side surface portions, whereby said body member can be gripped by a tool to enable  
3 manual or automated fabrication of said connector apparatus.